INSTRUMENTATION LOOPS

1) - measure feed flow and keep within specified range

2) - using feed flow and a ratio controller keep tails flow as specified:

ie. T/F = 1.4 - 1.5

3) - differential pressure cell to measure froth height. Control of froth height based on wash water addition. To be kept in 3' - 5' depth range. (~30 - 65 USGPM)

4) - air rotameters calibrated as manual adjustments will be made to determine optimum flow. (~20 - 40 SCFM)

PLANT COLUMN FLOTATION THEORETICAL CALCULATIONS

Theoretical Data

Feed Characteristics

260 tph 1% Zn Head
72% Overall Recovery
(Conventional Cells)

∴ 3rd CLNR CON. = 3.74 tph @ 50% Zn
Assume 30% Solids
@ = 1290 kg/m³
Slurry Flow: 43 USGPM

Product Requirement

a) 50% Recovery @ 55% Zn
b) 70% Recovery @ 54% Zn
c) 90% Recovery @ 54% Zn

Air Rate; 20 - 40 SCFM
Washwater; 30 - 65 USGPM

Column Area Calculations

$$Ac = \frac{1.18 \times 10^{4}\ wdb}{Jg * e_p\ d^{2}_{o}}$$

a) 50% Recovery

$w_.$ = 1.7 tph
J_g* = 2.19 cm/s
d_b = 0.3 cm
d_{so} = 104 um

$$Ac = \frac{1.18 \times 10^4 (1700) (0.3)}{2.19 (4.2) (104)}$$

$Ac = 6300\ cm^2$

(1) 36" CIRCULAR COLUMN

b) 70% Recovery

w = 2.42 tph

All other variables as before

$$Ac = \frac{1.18 \times 10^4 (2420) (0.3)}{2.19 (4.2) (104)}$$

$Ac = 9000\ cm^2$

(2) 36" CIRCULAR COLUMNS

c) 90% Recovery

w = 3.12 tph

All other variables as before

$$Ac = \frac{1.18 \times 10^4 (3120) (0.3)}{2.19 (4.2) (104)}$$

$Ac = 11600\ cm^2$

(2) 36" CIRCULAR COLUMNS

CALCULATIONS

COLUMN CROSS-SECTIONAL AREA

Milling 260 tph @ 1.5% Zn
72% Conventional Cell Recovery
3rd CLNR Zn, Con; 5.62 tph @ 50% Zn
30% Solids

Product Requirements
90% recovery @ 54% Grade
∴ 4.68 tph @ 54% Zn

$$A_c = \frac{1.8 \times 10^4 \, (w) \, d_b}{e_p \, d_{80} \, J_g^*} = \frac{1.18 \times 10^4 \, (4680) \, (0.3)}{4.2 \, (104) \, (2.19)}$$

e_p: particle s.g.
d_{80}: cummulative 80% passing particle size (nm)
J_g^*: Superficial gas rate ($cm/_s$)
d_b: Bubble diameter (cm)
w: column product (kg/hr)

∴ $A_c = 17{,}331 \ cm^2$

36" column;	6500 cm^2
48" column;	11600 cm^2
Total	18,100 cm^2